AMENDED SPECIFICATION

Reprinted as amended in accordance with the Decision of the Superintending Examiner acting for the Comptroller General dated the twenty fourth day of October, 1966, under Section 14, of the Patents Act, 1949.

PATENT SPECIFICATION

973,575

DRAWINGS ATTACHED

973,575

Inventor: LEONARD BAKER

Date of filing Complete Specification: Oct. 24, 1962.

Application Date: Sept. 1, 1961. No. 31468/61.

Complete Specification Published: Oct. 28, 1964.

Index at acceptance:—B3 D2E1

Int. Cl.:—fication:—B24b.

COMPLETE SPECIFICATION

Improvements in Grinding

We, COVENTRY GAUGE & TOOL COMPANY LIMITED, a British Company of Fletcham... the invention into practice as applied to thread

SPECIFICATION NO. 973,575

By a direction given under Section 17 (1) of the Patents Act 1949 this application proceeded in the name of COVENTRY GAUGE & TOOL COMPANY LIMITED, a British Company, of Fletchamstead Highway, Coventry, Warwickshire.

THE PATENT OFFICE

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... grinding using a thread or like ribbed grinding wheel is characterised by subjecting the area or areas of contact between the grinding wheel and the workpiece to one or more jets of coolant fluid from one or more directions and of narrow form and of lateral extent at least corresponding to the effective peripheral width of the grinding wheel and operating at a pressure of not less than 120 lbs per square inch whereby the jet or jets break through the peripheral air streams which tends to follow about the grinding wheel under working conditions.

In the accompanying drawings:—

FIGURE 1 shows a typical arrangement of nozzles in relation to a grinding wheel and workpiece;

FIGURE 2 is an axial plane section of one of the nozzles;

FIGURE 3 is a front view of the nozzle shown in FIGURE 2 and

FIGURE 4 is a view similar to FIGURE 2 but showing a modification.

Referring to the drawings and in carrying ... work 1.

The pressure at which the coolant fluid is directed at the area 4 of contact is at least 120 lbs per square inch preferably in the region of 150 to 200 lbs per square inch. Practical tests have established that by employing pressures of this order the workpiece and/or grinding wheel speeds of rotation can be considerably increased without any tendency towards over heating developing. Thus for example the speed of rotation of the workpiece 1 may be increased to some six to ten times with a consequent increased rate of production. Whereas the peripheral speed of the grinding wheel 2 may be kept at the usual 6000 feet per second, the speed may be increased, e.g. up to 10,000, 15,000 feet per second or more.

Such higher speeds of workpiece and/or grinding wheel rotation with resultant increased production rates may be achieved whether pass grinding or plunge grinding techniques are employed.

It is believed that the high pressure of the coolant jet or jets has the effect of breaking

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COMPLETE SPECIFICATION

Improvements in Grinding

We, COVENTRY GAUGE & TOOL COMPANY LIMITED, a British Company of Fletchamstead, Coventry, Warwickshire, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to grinding using a thread or like ribbed grinding wheel more particularly thread and gear grinding and has for its object to provide a method and means whereby the rate of production is very considerably increased and at the same time an improved finish of the work obtained.

According to this invention the method of grinding using a thread or like ribbed grinding wheel is characterised by subjecting the area or areas of contact between the grinding wheel and the workpiece to one or more jets of coolant fluid from one or more directions and of narrow form and of lateral extent at least corresponding to the effective peripheral width of the grinding wheel and operating at a pressure of not less than 120 lbs per square inch whereby the jet or jets break through the peripheral air streams which tends to follow about the grinding wheel under working conditions.

In the accompanying drawings:—

FIGURE 1 shows a typical arrangement of nozzles in relation to a grinding wheel and workpiece;

FIGURE 2 is an axial plane section of one of the nozzles;

FIGURE 3 is a front view of the nozzle shown in FIGURE 2 and

FIGURE 4 is a view similar to FIGURE 2 but showing a modification.

Referring to the drawings and in carrying the invention into practice as applied to thread or gear grinding the set up for grinding a workpiece 1 follows normal practice in that the latter is mounted in a grinding machine for contact with the grinding wheel 2 in the usual way.

For the purposes of this invention one or more nozzles 3 for directing coolant fluid or oil at the wheel 2 and workpiece 1 is or are arranged in close proximity to the general area 4 of contact between them. Thus a pair of nozzles 3 may be provided one at each side (i.e. above and below) of the area 4 of contact and arranged to direct coolant fluid into the corresponding locality between the wheel 2 and work 1.

The pressure at which the coolant fluid is directed at the area 4 of contact is at least 120 lbs per square inch preferably in the region of 150 to 200 lbs per square inch. Practical tests have established that by employing pressures of this order the workpiece and/or grinding wheel speeds of rotation can be considerably increased without any tendency towards over heating developing. Thus for example the speed of rotation of the workpiece 1 may be increased to some six to ten times with a consequent increased rate of production. Whereas the peripheral speed of the grinding wheel 2 may be kept at the usual 6000 feet per second, the speed may be increased, e.g. up to 10,000, 15,000 feet per second or more.

Such higher speeds of workpiece and/or grinding wheel rotation with resultant increased production rates may be achieved whether pass grinding or plunge grinding techniques are employed.

It is believed that the high pressure of the coolant jet or jets has the effect of breaking

through the peripheral stream of air which follows about the workpiece 1 and wheel 2 more particularly the latter so that the coolant definitely reaches the area 4 of actual contact between the wheel 2 and work 1 in an adequate and continuous manner for dissipating the heat that is generated. Thus over heating or "burning" of the workpiece 1 with resultant softening of the latter is avoided despite the higher speeds employed. Furthermore it is found that the finish of the ground work is of an improved standard due to the higher speeds of abrasion and the adequate cooling effected.

A further advantage of the invention is found to reside in the fact that due to the high pressure of the coolant jet or jets, the fluid penetrates into the pores of the grinding wheel periphery maintaining the latter in a clean condition substantially free of metal particles.

The orifice of the nozzle or nozzles 3 may be of slit or like elongated form so that a flat jet is provided of a lateral extent at least corresponding to the effective peripheral width of the grinding wheel 2.

The nozzles 3 shown in the drawings provide such a jet and on referring to FIGURES 2, 3 and 4 it will be noted that the nozzle orifice is transversely grooved by a V-section groove 5 (FIGURES 1, 2 and 3) or a part circular section groove 5a (FIGURE 4).

The required coolant pressure may be achieved by means of a suitable pump such as a gear pump, a filter being preferably provided in association with the latter to remove metal particles from the fluid as it is recirculated by the pump. Having regard to the high pressures involved the wheel 2 and workpiece 1 should be effectively enclosed by suitable safety guard means.

The invention includes within its scope not only the method of grinding as herein described but also grinding machines or apparatus equipped or modified for the purpose of the invention as well as conversion units or equipment for such modification.

WHAT WE CLAIM IS:—

1. Method of grinding using a thread or like ribbed grinding wheel characterised by subjecting the area or areas of contact between the grinding wheel and the workpiece to one or more jets of coolant fluid from one or more directions and of narrow form and of lateral extent at least corresponding to the effective peripheral width of the grinding wheel and operating at a pressure of not less than 120 lbs per square inch whereby the jet or jets break through the peripheral air stream which tends to follow about the grinding wheel under working conditions.

2. Coolant apparatus of or for a grinding machine using a thread or like ribbed grinding wheel and for carrying out the method of grinding according to claim 1 wherein the apparatus is arranged to provide a jet or jets of coolant fluid at at least the pressure specified by means of one or more nozzles arranged to provide said jet or jets of narrow form.

3. Method of grinding using a thread or like ribbed grinding wheel substantially as herein described with reference to the accompanying drawings.

4. Coolant apparatus of or for a grinding machine using a thread or like ribbed grinding wheel and for carrying out the method of grinding according to claim 1 substantially as herein described with reference to FIGURES 1, 2 and 3 or FIGURE 4 of the accompanying drawings.

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Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press (Leamington) Ltd.—1967. Published by The Patent Office, 25 Southampton Buildings, London, W.C.2, from which copies may be obtained.

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1 SHEET

AMENDED SPECIFICATION

This drawing is a reproduction of the Original on a reduced scale

FIG. 1

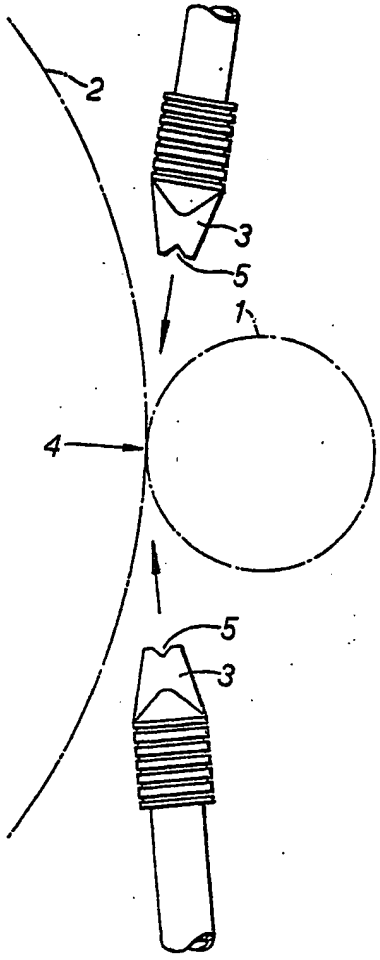

FIG. 2.

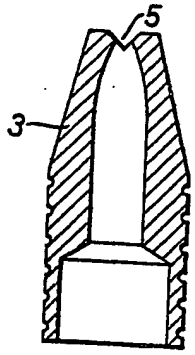

FIG. 3.

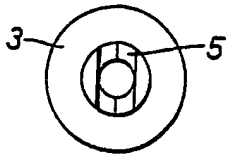

FIG. 4.